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becomes thrown into a series of folds (Balfour's septæ) in the abdominal region, dividing the yelk into a series of lobes, the rudiments of the liver.[1] The proctodæum and stomodæum offer nothing for note. The mesenteron does not begin to take definite shape until a day or two before hatching. Then the entoderm-cells which are scattered through the yelk gather at the inner ends of the fore and hind guts, and later unite in the middle. A similar process gives rise to the liver epithelium. This process is not completed at hatching, and for some time the young spider takes no food, the yelk remaining serving for food. The lungs arise as ectodermal invaginations at the base of the first pair of abdominal appendages, these becoming converted into their outer covering. The second pair of abdominal appendages disappear, the third and fourth are converted into the spinnerets, the spinning glands arising as ectodermal invaginations into their walls. —*J. S. K.*

PSYCHOLOGY.

The Seat of Consciousness.—M. Steiner, of Heidelberg, presented to the Academy of Science of Berlin, on January 7, 1887, a memoir on the consciousness of the cerebral hemispheres in fishes. The author, who has published a similar paper on the Batrachia, comes to the following conclusions:

1. In the fishes voluntary movements and the ability to feed spontaneously (proving the existence of both reflex and direct sensations) *persist* after the removal of the hemispheres.
2. In Batrachia these functions are bound to the hemispheres, excepting vision, which remains after their removal.
3. In birds vision is also located in the hemispheres, but not cutaneous sensation.
4. In the Mammalia, finally, the cutaneous sensations also are located in the hemispheres.

The author therefore concludes that in the Vertebrata the functions of the middle brain emigrate little by little into the hemispheres as they develop; or, rather, that the evolution of hemispheres depends on a successive accumulation of functions which at first belong to the middle brain.—*A. Herzen in Revue Scientifique*, No. 9, 1887.

Remarkable Intelligence of a Rat.—As throwing light upon the question of the intelligence of the animal creation, in the exhibition of memory and reasoning power, beyond the mere pale of recognized instinct, I wish to give the readers of the AMERICAN NATURALIST a brief account of an interesting incident of which I was witness. On a very warm day in early summer I happened to be standing near a chicken-coop in a back yard when I noticed the head of a very gray and grizzled rat thrust from a neighboring rat-hole, and concluded to watch the movements of the veteran. After a careful survey of the surroundings, our old rodent seemed to be satisfied that all was right and made a cautious exit from the home retreat. A fresh pan of water had been recently placed before the chicken-coop for the use of Mother "Chick" and her interesting brood. These all seemed to have satisfied their thirst, and the water looked a friendly invitation to the thirsty old rat, which immediately started towards it. The rat had not reached the pan before five half-grown young ones rushed ahead and tried to be first at the water. The old rat thereupon immediately made a leap like a kangaroo, and was at the edge of the dish in advance of the foremost of her litter. Then ensued a most remarkable occurrence. The mother rat raised herself on her haunches and bit and scratched her offspring so severely, whenever they attempted to reach the water, that they all finally scudded away, evidently very much astonished and frightened at the strange and unaccountable behavior of their mother. I was as much astonished as they, and awaited with renewed interest the outcome of this remarkable performance. When the little ones were at a safe distance, the reason for her extraordinary behavior began to be revealed at once in the intelligent actions of the old mother rat. She first wet her whiskers in the water, looked suspiciously about her, then very cautiously and carefully took a dainty little sip of the liquid. She tasted it as tentatively and critically as a professional tea-taster, and when she was satisfied that it contained no poisonous or other deleterious matter, she gave a couple of squeaks, which quickly brought her young and thirsty brood to her side, and all fearlessly drank to their fill. Now, this old mother rat was experienced, had evidently learned her lesson in that school thoroughly, and so she would not allow her young and untaught litter to taste water which might have contained *rat poison*, or what not, until she had satisfied herself that the liquid was harmless. As I witnessed this little scene in lowly animal life the thought would keep coming, Does not this look very like reason?—*J. Croll Baum*, 630 *N. Broad St., Phila., Pa.*

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[1] Compare Limulus.—*Ed. Nat.*

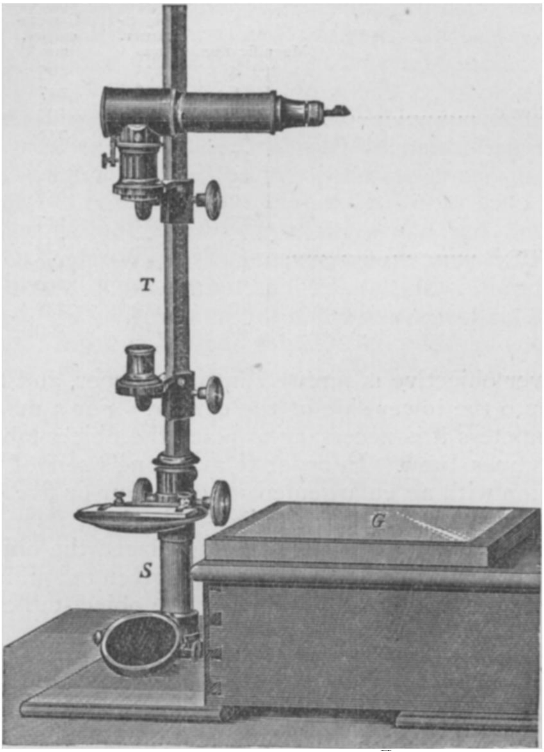
Ants and Sunflowers.—While riding out, one day in July last, over the prairies north of Kirwin, Phillips County, Kansas, my attention was attracted by a number of ant-hills surrounded by sunflowers. A closer examination showed that the hills were inhabited by a large red ant, one-half to three-quarters of an inch long. Their hills were only two or three inches high and from one to two feet in diameter, but for a radius of two to four feet around each hill every particle of vegetation was cleared off, and around the outside of this cleared space grew a single row of sunflowers, affording considerable shade to the circular court within.

The prairie was unbroken where these hills were seen, though cultivated fields were not far distant. Query, Where did the ants get their sunflower seed?

There were three other gentlemen with me who observed and commented on this curious circumstance.—*Erving L. Richardson.*

MICROSCOPY.[1]

The Embryoscope.—The embryoscope devised by Hartnack[2] represents an improved form of the drawing apparatus introduced by Professor His.[3] The magnifying power of this instrument may be made to vary at pleasure from *four to seventy* diameters, thus offering the same facilities for making exact contour drawings with low powers that the microscope affords with higher powers.



For this wide range of magnification only two objectives are used. The height of the rod bearing the mirror, the object-table, the objective, and the camera lucida, is about 40 cm. The glass

[1] Edited by C. O. WHITMAN, Ph.D., Milwaukee, Wisconsin.

[2] Zeitschrift für Instrumentenkunde, Sept. 1881, p. 284.

[3] Anatomie menschlicher Embryonen, Leipzig, 1880, p. 8.